FORUM

Sustainable Agriculture: Efficient and Economical Practices for Maximum Production and Environmental Stewardship

On February 19, 2009, the *New York Times* ran an article about the city's growing enthusiasm for urban composting, including the story of one dedicated couple in Manhattan who maintained a compost bin under their bed. At the Agricultural Research Service (ARS), our zeal for composting is exemplified—in a somewhat more restrained fashion—by the activities of ARS microbiologist Patricia Millner, who spearheaded efforts to transform 11,370 pounds of cafeteria trash from the USDA Jamie L. Whitten Federal Building in Washington, D.C. into garden compost.

Millner is just one of the many ARS scientists helping to refine approaches for truly sustainable agriculture—practices that are simultaneously productive, profitable, and protective of the long-term availability of natural resources. Competing demands for land, water, and even air mean that we need to take every opportunity to ramp up sustainable agricultural production both at home and overseas.

Numbers alone highlight this urgency: According to the 2007 Census of Agriculture, which was released this past February, producers on 2,204,792 farms in the United States produce food, feed, fiber, and fuel worth some $297 billion. In their efforts, they use 922 million acres of farmlands—an expanse 5½ times the size of Texas—and spend around $241 billion for fertilizer, fuel, seed, feed, livestock, and labor.

Maintaining our present level of food production in a sustainable way is just the first task. U.S. Census experts estimated that 304 million people lived in the United States in 2007. In 2050, that number is projected to be 439 million. Our larger challenge is not only to maintain our present levels of production to meet demand, but also to ensure that future generations are able to meet their needs.

Events in the past year, like corn tortilla riots in Mexico, bread riots in Egypt, and rice hoarding in Asia, underline the reality that food security is vital to national security. The challenges presented by global climate change introduce even more uncertainty in determining how our production practices will need to change to keep our food supply secure. But a large part of the answer will be to make sure we maximize our returns from every acre of cropland, pastureland, and rangeland in ways that also protect the environment and conserve the natural resources that we all depend on.

The ARS Natural Resources and Sustainable Agricultural Systems national programs organize and support researchers at 70 locations across the United States. One of those national programs, Agricultural System Competitiveness and Sustainability (#216), uses an interdisciplinary systems research approach to bring together the expertise needed for finding ways to fundamentally transform how farms function. Our goal is to provide new information and technologies that will improve agricultural productivity, profitability, energy efficiency, and natural-resource stewardship.

Farmers and other stakeholders across the country tell us they're looking for holistic solutions to their production issues. So our research includes collaborations with scientific teams made up of biologists, physical scientists, ecologists, economists, sociologists, engineers, mathematicians, modelers, and computer scientists—both within ARS and in other federal, state, and private organizations.

In national program #216, we focus on several approaches for attaining whole-farm competitiveness and sustainability. We're identifying new management strategies for using on-farm resources and natural ecosystem processes to reduce the need to buy fertilizers, pesticides, and other inputs, which will help reduce whole-farm costs and risks.

We're developing precision management, automation, and decision-support technologies to increase production efficiencies, reduce costs, and limit adverse effects on natural resources—or even to enhance the quality of those resources. We're creating strategies for merging sustainable biobased energy production with existing farm production to increase the options for producer profits and contribute to whole-farm energy self-sufficiency.

We're learning more about consumer preferences. And we're combining that information with other research on supply-chain economics to expand market opportunities and demonstrate how producers can respond to changing markets and increase their earnings.

Farming practices in the United States generate a diverse set of economic and environmental challenges and opportunities. This issue of *Agricultural Research* does not attempt to present a comprehensive outline of the many ways ARS scientists are tackling these issues. Instead, we're providing a regional snapshot of ARS research: water supply issues in the West, food production in the East, and biofeedstock production in the Midwest.

We've got a big agenda at ARS. We're lucky to have top-notch professionals—scientists, technicians, and support staff—at the bench and in the field, leading efforts to optimize U.S. agricultural production, protect our natural resources, and contribute to the development of new energy sources.

But please don't look under our beds.

Steven R. Shafer
ARS Deputy Administrator
Natural Resources and Sustainable Agricultural Systems
Beltsville, Maryland